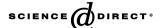


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Coping with disaster: Rehabilitating coastal livelihoods and communities

Robert S. Pomeroy^{a,*}, Blake D. Ratner^a, Stephen J. Hall^a, Jate Pimoljinda^b, V. Vivekanandan^c

WorldFish Center, Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Penang, Malaysia
 Coastal Habitats and Resources Management Project, Krabi, Thailand
 South Indian Federation of Fishermen Societies, Karamana, Trivandrum, India

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Abstract

This paper examines lessons from past approaches to natural disasters, as well as early lessons from the post-2004 Asian tsunami rehabilitation, to draw out general principles for rehabilitating livelihoods in poor coastal communities. We contend that avoiding the mistakes of the past requires: (1) a framework for understanding the diversity of coastal people's livelihood strategies and the sources of their vulnerability, (2) a process for designing interventions that build on this understanding in order to strengthen and revitalize coastal communities, including a means of assessing and selecting the most promising livelihood options, and (3) a focus on the longer-term challenge of building future resilience and sustainability in the communities by addressing the root causes of vulnerability.

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1. Introduction

The status of many coastal communities in the developing world can at best be described as fragile. With a high dependency on a severely depleted and overfished natural resource base and on badly degraded coastal ecosystems, few coastal communities in the developing world have found sustainable routes out of poverty. For such communities, the added onslaught that is brought by natural disaster can prove to be an almost intolerable burden that extinguishes existing livelihood options, inadequate as they may be.

The impact of the December 2004 Asian tsunami, for example, on rural coastal communities in India, Indonesia, Sri Lanka and Thailand, particularly poor fishing and aquaculture households, was disproportionate in comparison with other groups of people in the region. It is estimated that the livelihoods of up to 2.5 million people in fishing and aquaculture households in the region were

affected. The fishing and aquaculture households in the rural coastal communities made up an estimated onequarter of all fatalities. Rural coastal communities in the four countries generally have a higher percentage of people living below the poverty line than is the national average [1]. The high dependence on natural resources makes these communities particularly vulnerable to changes in resource condition. The impact of the tsunami was greatest on the poor, as they have the fewest resources and their ability to recover is the weakest. While some have been able to adapt and shift to other livelihoods posttsunami, for many, their situation just got worse. Not only were lives lost, but so too were household and productive assets (such as boats, ponds, marketing facilities and jetties). These losses reduced the ability of households to earn income and sustain livelihoods. In some areas, whole communities were destroyed. Direct losses to the fisheries and aquaculture sector have been estimated to be around US\$420 million. This does not include indirect losses from lost earnings and the impacts on associated industries such as processing, marketing and input supply [2].

^{*}Corresponding author. Tel.: +18604059215; fax: +18604059109. E-mail address: Robert.pomeroy@uconn.edu (R.S. Pomeroy).

Unfortunately, the response to past natural disasters around the world has usually focused on physical reconstruction, with relatively little attention paid to how individuals and communities can rebuild livelihoods that have long-term sustainability. One important consequence of this approach is that beneficiaries of support often feel unable to drive their own recovery [3–14].

Stimulated by the tragedy of the December 2004 Asian tsunami, this paper examines lessons from past approaches as well as early lessons from the post-tsunami rehabilitation to draw out general principles for rehabilitating livelihoods in poor coastal communities. We contend that avoiding the mistakes of the past requires: (1) a framework for understanding the diversity of coastal people's livelihood strategies and the sources of their vulnerability, (2) a process for designing interventions that build on this understanding in order to strengthen and revitalize coastal communities, including a means of assessing and selecting the most promising livelihood options, and (3) a focus on the longer-term challenge of building future resilience and sustainability in the communities by addressing the root causes of vulnerability.

In discussing these three elements within the context of the tsunami, we seek to provide guidance not only for those involved in efforts to rehabilitate coastal livelihoods affected by this particular tragedy, but also for those faced with similar challenges from future natural disasters. By adopting the approaches advocated here we believe that rehabilitation efforts can be re-focused to look beyond returning to the (un-sustainable) status quo of the past and seek to address the root causes of vulnerability—issues of resource access, marginalization, market access, power imbalances, lack of information, unsustainable resource use—and build resilience to cope with future threats and opportunities.

2. Understanding coastal livelihoods

Rehabilitation of coastal livelihoods after the tsunami needs to look beyond a return to the status quo and address the root causes of vulnerability of coastal people and communities; it needs to build both resilience to cope with future threats and ability to exploit opportunities. Adopting this approach requires understanding the diversity of coastal people and communities, especially in relation to their livelihood strategies. It also requires understanding the means by which households adapt to reduce their risks, the incentives that drive the decisions of resource users and the sources of their vulnerability to stresses and shocks.

Recent research and practice in coastal community development in South and Southeast Asia suggest that diversity, adaptation, incentives and vulnerability all need to be appreciated when undertaking an analysis of coastal livelihoods.

2.1. Diversity

Although the dominant livelihood in many coastal communities, capture fishing is not the only livelihood. Indeed, even when fishing and agriculture are accounted for, all the other livelihoods (ranging from fish-processing to tourism) combined can employ an equal or greater number of people in many coastal communities. These other livelihoods are also likely to employ a wider mix of persons, including women and those from nonfishing communities that live near the coast.

Coastal communities and the people who live in them are not homogeneous. Even within a single community, coastal-resource users may have quite distinct economic orientations. They may be full-time, part-time, seasonal or migratory and coastal households may have a commercial or subsistence orientation. Livelihoods may be based on a subsistence or wealth-creation goal and on a diversified or specialist strategy [15].

2.2. Adaptation

Many households in coastal communities undertake a range of activities in order to cope financially and reduce the risks associated with high economic dependency on natural resources [16,17]. Fishing itself is a diverse occupation, with most fisheries in Asia being both multispecies and multi-gear in nature. Existing livelihood strategies may be modified, or new strategies adopted to meet changing conditions.

It is important to focus not only on the resource user but also on the whole household and household livelihood strategy. For example, all or some of the family members may engage in different livelihood activities, and these activities may change both temporally and spatially throughout the year depending on economic, resource and environmental conditions. The household livelihood strategy may be based on relationships between the extended family or within the nuclear family.

The household livelihood strategy mix will depend upon season, access to the resource (whether fishing areas or farm land), access to capital, skill base, education and risk preference. Coastal residents may also engage in illegal activities for livelihood, such as dynamite fishing or smuggling. Rather than being specialized, and therefore vulnerable to a sudden change, many households in coastal communities are well situated to adapt to changing circumstances. The net result of this occupational diversity is that many coastal communities are best understood as dependent not on a single resource but on a whole ecosystem, marine and terrestrial.

Fishers in southeast Asia generally like their occupation, despite the risks, and few would change to another occupation with similar income [18]. Those most likely to leave fishing for another occupation tend to obtain less of their income from fishing and coastal activities and to have more education. If it is deemed appropriate to provide an

alternative occupation that is attractive to fishers, it should, at least, have some of the same characteristics as those considered desirable in fishing. These characteristics include the relative ease of obtaining food and income, the pleasure of being at sea, and the independence of being self-employed. A common alternative livelihood considered for fishers is aquaculture. Evidence exists that fishers would consider aquaculture as an alternative source of food and income, especially if the cost of the technology was low, income was good, and other family members could be involved in the operation [19].

2.3. Incentives

The incentive structures that individuals and households face are in part economic and in part related to other external factors, such as property rights, rules governing resource use, and levels of enforcement. Many coastal resource users exist at the subsistence level and have a short-run survival strategy of taking care of the daily needs of themselves and their family. These resource users, such as fishers, due to limited capital mobility and lack of alternative livelihoods, will use whatever resources are available to them (technology, skill, capital) in order to harvest as much of the resource as possible. These resource users have what is called a high discount rate concerning use of the resource—they prefer profits and food now over a continual flow in perpetuity [20].

Cultivating an awareness of the problems of unsustainable resource use is therefore only a small first step. The more difficult and vital work involves shifting the incentives that resource users face. This includes efforts that build on the array of opportunities and resources at people's disposal—so that they become less directly dependent on the local natural resources for their daily subsistence—and strengthen their security of tenure (whether private or communal)—so that users have a greater stake in a longer-term perspective.

2.4. Vulnerability

The physical isolation of some coastal communities makes them highly resource-dependent and reduces access to alternative livelihoods; this can make them especially vulnerable to any disruptions. Yet even physical isolation can be mitigated through appropriate improvements to infrastructure, health and education services and improved access to information and markets.

Some aspects of household vulnerability vary with the seasons. While occupational diversification may allow households to maintain a level of income throughout the year, there may be periods of high income (as when crops are harvested or fishing is good) and low income (as when fishing is poor or not possible due to storms). A household's ability to weather these slack periods depends also on the availability of other sources of income, including remittances from family members living outside

the area, informal loans from money lenders or traders, and systems of mutual support at the community level.

Other root causes of vulnerability in coastal communities are social and economic power imbalances, lack of participation in decision-making, limited asset ownership, resource dependence, and laws and regulations that influence people's ability to use assets. Once the root causes of vulnerability are recognized, interventions can be put in place to address them and to increase the resilience of the community to shocks, seasonal factors, and human and natural changes. Building resilience means, in part, reducing reliance upon natural resources for livelihoods, strengthening community institutions, organizations and infrastructure, and diversifying livelihoods.

3. A process for rehabilitating coastal livelihoods

The rehabilitation of coastal livelihoods after a natural disaster should be seen as an opportunity to strengthen and revitalize coastal communities. The focus of rehabilitation efforts should be on rebuilding the economic basis of livelihoods rather than on physical reconstruction, and on giving coastal people the skills and resources for self-recovery. Both the public and private sectors need to be actively involved in livelihood rehabilitation efforts, seeking out and creating opportunities for both economic and social development.

The rehabilitation of coastal livelihoods should be undertaken through a process of change that will address the recurrent factors that make them vulnerable [21]. Some of these factors can be addressed more immediately, while others, such as equity, power relations, access to resources and markets, asset ownership and sustainability of resource use, are more fundamental and difficult to alter. Social development (empowerment, organizations, education, training), economic development (job creation, private sector investment, market access, microfinance) and ecological interventions (rehabilitating coastal habitats, coastal resource management) that address these fundamental issues must be integrated.

Because not everything can be done at once, a process for assessing and deciding on rehabilitation actions needs to take into account issues of both staging and scale: What actions are feasible now and what steps are needed to address more fundamental problems over the longer term? What can be done at the local community level and what challenges are more systemic, requiring policy or institutional change at national or even international levels? Experience from the early stages of tsunami response efforts in India and Thailand reinforces this message. Organizations engaged in coordinating recovery efforts there have learned that rehabilitation interventions should be phased in over time, not trying to achieve too much too soon; yet, at the same time disasters expose pre-disaster weaknesses in social and biophysical conditions in coastal communities, providing an important occasion to evaluate the vulnerabilities and work to address them.

A number of different processes can be followed to rehabilitate coastal livelihoods in disaster-affected areas, and it is important to stress that there is no blueprint or single correct approach. However, it is vital that the process be well planned at the operational level and be participatory, involving consultation and collaboration with the community. Recognizing that short-term, uncoordinated action can be detrimental to sustainable long-term rehabilitation, it is also vital that any process be grounded in a longer-term strategic plan. For example, a process for rehabilitating coastal livelihoods may involve the following 7 steps¹:

- 1. Defining the target area.
- 2. Community entry and integration.
- 3. Assessments of resources, needs and opportunities.
- 4. Education and capacity development.
- 5. Rehabilitation plan.
- 6. Long-term sustainability plan.
- 7. Adaptive learning through monitoring and evaluation.

Whatever steps are followed in the process of planning, implementing and evaluating the rehabilitation of livelihoods, it will be necessary to repeatedly evaluate a range of options. In practice, assessing more immediate options inevitably points to underlying constraints in the local livelihood context as well as opportunities to address these over different time periods and at various scales. For ease of exposition, we present here first criteria useful in assessing what options are feasible. In the next section, we discuss in more detail principles for addressing the root causes of vulnerability. These factors need to be kept in sharp focus throughout the rehabilitation process. When addressed, they effectively change the boundaries of what is feasible and possible, improving the chances that communities can build resilience to cope with future threats and opportunities.

Key criteria for assessing livelihood options include:

Social feasibility: It is fundamental that any process of rehabilitating coastal livelihoods be 'socially feasible', i.e., that the livelihood options be compatible with the needs and aspirations, existing work ethic and livelihood strategies, organization, economic and social structure, gender differences, and culture of the affected community and households. Various livelihood options need to be made available because individual and household goals, attitudes and preferences will differ [19]. The livelihood options should improve the independence, innovative capacity and adaptability of the community and not increase the vulnerability of the coastal people [22]. Livelihoods that are sustainable tend to evolve in response

to local skills, market demand, comparative advantage, and available resources.

Technical feasibility: The choice of livelihood options, and specifically the technology associated with the livelihood options, will be dependent upon four factors: its associated management intensity, technological complexity, risk level and economics. Simple livelihoods that require low levels of capitalization and extensive, rather than intensive, levels of management are often preferable for many coastal communities. A labor-intensive operation is better suited for communities where labor is abundant. wage rates low, and capital relatively scarce. A livelihood with a low-gain, low-risk strategy, in which the burden of risk is shared by others, is likely be more attractive to the target group than one which offers high gain and high risk. The long-term benefits of introducing a livelihood that may be simple but can guarantee early success with low risk, may outweigh a livelihood that offers high profits but has greater complexity and expense. The livelihood must be at a level that can be maintained and operated by the target group and that can generate cash flow over the long term [19].

Institutional sustainability: The best approaches to rehabilitate coastal livelihoods must be sustained by the beneficiaries after external organizations, with their human, technical and financial resources, phase out assistance to the community. Successful efforts to enhance existing livelihoods, diversify, or adopt alternative livelihoods typically stem from participatory decision-making, bearing in mind the capacity and incentives for coastal people to engage in the livelihood strategy. Rarely are livelihoods imposed from outside the community sustained. In the long term, conditions in a dynamic coastal environment will change and coastal people will need to be provided with the skills and ability to innovate new strategies and adapt to change. Approaches to rehabilitating coastal livelihoods must acknowledge that change on the coast is an ongoing process. A viable livelihood today will only be sustainable if it incorporates the capacity to evolve with the changes around it [22].

Supporting infrastructure and policy environment: The sustainability, and therefore choice, of a livelihood option will depend on the availability of supporting infrastructure and the enabling environment, including credit, inputs, markets and technical assistance. Available credit at reasonable rates, training in business and financial management, and credit supervision will be required. The marketing system should be examined to identify opportunities and constraints, such as product requirements, price, physical infrastructure improvements, marketing channels, and the role of market intermediaries. Government support and intervention, such as the establishment of production cooperatives, may be necessary to support the marketing system. Policy reform may be needed to create an enabling environment for the livelihood options. The supply of necessary inputs to support the livelihood option must be identified and secured. Effective technical assistance, such

¹These steps and additional sources of practical guidance on rehabilitation assessment and planning are detailed in R.S. Pomeroy et al., Guidelines for Rehabilitating Livelihoods in Tsunami-Affected Coastal Communities in Asia (WorldFish Center: Penang, Malaysia), in press.

as extension services, should be in place to provide specialized training and technical assistance on a continuing basis. Private sector support can also provide, or help provide, credit, markets and technical assistance. One of the most pervasive problems for many livelihood options using natural resources is the lack of legal property rights to land, water and species. The strength of property rights will influence the nature of use and management of the resources, and the economic returns from the resource.

Assessing the feasibility and appropriateness of various livelihood options at the community level invariably points to constraints in the enabling environment and related factors of community vulnerability. The next section discusses these in more detail.

4. From disaster to opportunity: addressing the root causes of vulnerability

To rehabilitate coastal livelihoods in a manner that will be effective and sustainable requires addressing the factors that have led to vulnerability—unsustainable livelihoods, high levels of poverty and a declining quality of life in coastal communities. Rehabilitation of coastal livelihoods means more than giving people jobs. Much more importantly, it means addressing fundamental social, economic and environmental reforms that affect coastal communities and livelihoods.

Achieving needed reforms is challenging because it involves coordination across sectors that are often governed through separate planning and regulatory processes. The stakes may also be high when reforms involve shifts in the control of economic resources or in decision-making authority. Because disasters bring the spotlight of societal attention on affected communities, however, they often open a window of opportunity to address more fundamental problems that at other times would not be possible. The relative importance of various factors of course differs by location; key issues to examine include the following:

Securing resource tenure and access: Coastal areas that offer a range of easily accessible livelihood opportunities that are rarely available in inland areas, often attract the poor, who exploit a range of resources from the land and sea with a range of harvesting methods. One reason that the poor are attracted to these resources is that they are typically 'open access' and are easily exploited with minimal capital resources. The open access nature of these resources makes them particularly vulnerable to overexploitation. As access to the resources becomes increasingly limited, the environment for users becomes increasingly competitive. Furthermore, more and more often, measures to control access, such as marine protected areas, are being used to conserve and protect these resources. In such cases, the land-tenure status of families and entire communities is often unclear in modern legal terms; and the poor are often the least able to defend their livelihoods or to establish legal tenure rights over the resource [23].

The rights of the poor to security of tenure over the resources upon which they depend for their livelihood need to be established and asserted so that they can make long-term investments in sustainable livelihoods and resource management. Post-disaster operations need to deal early and forcefully with land ownership issues. Where possible, land titles should be regularized or a functional proxy provided. In a larger sense, property rights over the resources need to be specified and secured to enable resource users to optimize use and ensure conservation of resources. The rehabilitation process is a way of clarifying and correcting past injustices and administrative inefficiencies and of providing equity and new tenure arrangements.

Building equitable market access: The free market both provides for and restricts livelihood opportunities for resource users and the community. With specialized traders, resource users often have little, if any, control over marketing outlets and the prices that they receive. Low incomes create a situation of potential dependence that influences the resource user's decisions about credit sources and marketing decisions [24]. This dependency becomes a motive for overexploitation of the open-access resource. Inequalities between resource user and trader suggest the need for the development of ways to increase the return received by resource users. New livelihood options, and increases in market power, can be found in the integration of resource users forward in the market chain once they have the skills to undertake the activity supplemented by microfinance. Microfinance and seed money to finance extremely small-scale—but nevertheless critically important—post-disaster actions, and to enable access to markets is helpful. However, the setting up of new microfinance institutions as a post-disaster response has been found to be largely ineffective; it is more effective to build on existing microfinance institutions. Microfinance can help kick-start businesses, and prevent debtors defaulting on loans. Microfinance can help poor households multiply income-generating opportunities. Actions to restore people's productive capacity and actions to revive market demand for their output and labor need to be complementary. Elimination of nontariff and tariff barriers to fish trade could increase employment in the processing sector.

Reducing excess capacity: In most coastal fisheries in Asia there is an excessive level of factor inputs (capital and labor) relative to that needed to catch the available fish. Thus, most fisheries can be characterized as having the problem of 'excess capacity', 'overcapitalization', or simply, too many fishers chasing too few fish [25]. Excess capacity was a serious problem prior to the tsunami, a problem that reconstruction should avoid reproducing. Because the capital and labor employed in coastal, small-scale fisheries are generally user-specific, their exit from the fisheries is often difficult and painfully slow. Fishing capacity in the areas affected by the tsunami should generally not exceed the levels that existed before,

and in most places should be reduced to help ensure the sustainability of the fisheries. In addition, there will be a need to restrict the use of some types of fishing gears, many of which may already be illegal, in order to reduce fishing effort and avoid destructive fishing practices. Rehabilitation efforts should ensure that less destructive and more sustainable fishing gears and practices are adopted.

Protecting ecosystems: The region's pattern of development and, more specifically, the persistence of widespread poverty, rapid and uncontrolled coastal development and environmental degradation have led to an increase in its vulnerability to natural disasters.

There is a need for increased respect for the fragility and vulnerability of coastal ecosystems, which serve an important coastal protection function and support coastal livelihoods. These coastal ecosystems, such as wetlands, mangroves, coral reefs, seagrass beds and sand dunes, should be identified and protected from development and uses that compromise their structural integrity. Degraded ecosystems will require rehabilitation to reestablish their ecological function. Protection of these coastal ecosystems will enhance their ability to provide long-term economic benefits to coastal communities by way of coastal protection, generation of a diversity of sustainable livelihoods and maintenance of the communities' natural resource capital. In a larger sense, rehabilitation of coastal communities and resources should involve coastal resource management—that is, a participatory process of planning, implementation and monitoring sustainable uses of coastal resources through collective action and sound decisionmaking [26].

Reducing vulnerability to natural hazards: Coastal areas are inherently exposed and dangerous. Despite this, people are attracted to the coast for economic and other reasons. Policies that reflect an understanding of the vulnerabilities of coastal areas to natural hazards have not been adequate. National and local development policies may need to be changed or enforced to avoid the settlement of large numbers of poor people in fragile areas. These policies will necessarily affect coastal livelihoods. Through land-use planning and coastal zone management, development may need to be directed away from coastal areas by, for example, use of a setback line [27]. Any new policies and regulations pertaining to land use and coastal development must not exclude the poor in favor of more affluent interests and development.

Empowering coastal communities: The economic and political marginalization of coastal communities has led to poverty and resource degradation. Addressing marginalization requires empowerment of community members and the transfer of economic and political power from a few to the impoverished majority. Individual and community empowerment are central to rehabilitating coastal livelihoods. Empowerment is concerned with the capability building of individuals and the community in order to increase social awareness, to gain greater autonomy over

decision-making, to gain greater self-reliance and to establish a balance in community power relations.

Empowerment covers a range of actions, including improving community access to information and services, ensuring community participation in decision-making, consciousness-raising of the people, improving business and enterprise management skills, and gaining control over the utilization and management of natural resources. While decentralization reforms that shift authority for decision-making to more local levels of government do not guarantee community empowerment, they can increase the opportunities for disadvantaged community members to access information or participate in decision-making [28]. The empowerment process must be balanced so that it reduces social stratification, rather than simply redistribute power to local elites.

Rebuilding community organizations: Disasters often weaken social structures and processes in the community, but rehabilitation efforts provide an opportunity to reinforce the positive strengths of existing social structures. Community organizations facilitate participation in decision-making over rehabilitation efforts and are essential for institutional sustainability. Many livelihood opportunities require that there be a critical mass of participants, or that there is participation in decision-making. In coastal areas affected by the December 2004 tsunami, some community organizations (fisher associations, cooperatives, women's groups) were already active. However, many coastal resource users, due to the nature of their livelihood, act individually or as a family unit. Most are not represented in community organizations that enable them to effectively engage in collective action to take advantage of an opportunity or overcome a threat, or to influence the direction of policies and decision-making.

Community organizations should be reestablished (if lost with the disaster) or newly established. In some cases, traditional community organizations that typically serve one function, such as regulating resource access, may take on new leadership roles in response to a disaster. For example, in Aceh, Indonesia, the Panglima Laot, 'Father of the Community', has undertaken a number of activities, providing coordination, leadership and social support, as a result of the December 2004 tsunami [29]. Community organizations must have the legal right to exist and make arrangements related to their needs. They must be recognized as legitimate and credible by the community and be transparent and accountable to their members. Community organizations can be networked to further strengthen their ability to serve and represent their members.

Integrating coastal communities into national economic development: Many rural coastal communities have been left behind as economic development progressed in other parts of the country; this furthered their economic marginalization. In addition (or as a result), rural coastal communities have often been a low priority in national economic development planning. Livelihood development

in coastal communities needs to be linked to national economic development plans and to current and future employment needs in the country. Rural coastal communities should be identified for private sector investment in jobs, both in and out of the fisheries sector. Education and skills training interventions can be targeted at residents of coastal communities to meet current and projected national employment needs. Greater attention to and investment in social and physical infrastructure that will improve the overall quality of life in coastal communities should be made. Paved roads to coastal communities, electricity, drainage, potable water, waste treatment, community halls and schools are some of the investments that serve as a foundation for rehabilitation. Access to telephones and the internet can open a world of communication and knowledge to coastal communities and serve to expand livelihood options.

Investing in education and training: Knowledge and information is power. Coastal resource users possess a great deal of indigenous knowledge. However, many coastal people are illiterate and this increases their vulnerability and limits their livelihood options. The rebuilding of coastal communities is a good time to address educational and training needs in coastal communities. New schools allow for the restructuring of curriculums to develop new knowledge and skills. Young men and women from the community can learn new skills that match the immediate needs of rebuilding, such as carpentry, masonry, plumbing, but that can also be used after rebuilding is completed. New skills, such as computer literacy, can be integrated into curriculums to provide a wider range of future employment opportunities. Business management and entrepreneurship training can assist people in taking advantage of business investment opportunities.

Training in disaster preparedness and management, such as safety at sea, can be linked with environmental education to improve the conservation and management of coastal resources. The key to effective disaster response is community-based preparedness so that communities can learn to help themselves [3–14].

5. Conclusions

In the wake of the Asian tsunami tragedy, large volumes of aid and a vast array of actors have flowed into affected areas. There is a very real risk that rehabilitation responses to this and future disasters will be developed from simplistic thinking and dominated by easy and ill-considered options, such as replacing lost boats and gear—which can lead to increased fishing capacity, further unsustainability of stocks and threats to livelihoods—or providing equipment and infrastructure for new incomegenerating schemes that are poorly suited to the local context.

Rehabilitation should look beyond reinstating the problems of the past and seek to address the root causes of vulnerability of coastal people and communities and to

build their resilience to future threats and capacity to exploit opportunities. Rehabilitation of coastal livelihoods is not merely about giving people jobs; it requires addressing fundamental social, economic and environmental reforms that affect coastal communities and livelihoods. Achieving progress in this direction means those providing assistance must engage coastal communities in a dialogue about the future they envision, the steps needed to get there, and the lessons learned along the way. At the same time it requires engaging a much broader array of actors across government, civil society and the private sector to build both understanding of the reforms needed and the commitment to undertake them. As lessons are learned, from both successful and unsuccessful interventions, they need to be shared with others for use now and in the future.

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References

- [1] Whittingham E, Campbell J, Townsley P. Global Overview, Poverty and reefs, vol. 1, DFID-IMM-IOC/UNESCO, Exeter, UK:IMM Ltd.:2003.
- [2] Consortium to restore shattered livelihoods in tsunami-devastated nations (CONSRN). 2005. Regional impacts of the tsunami on fisheries and aquaculture (updated 3 Feb 2005). www.apfic.org/ modules/wfsection/download.php?fileid = 58
- [3] World Bank. Lessons from natural disasters and emergency reconstruction. Operations Evaluation Department. 10 January, 2005, Washington DC.
- [4] Messer NM. The role of local institutions and their interaction in disaster risk mitigation: a literature review. UN Food and Agriculture Organization, Rome, 2003. www.fao.org/documents/show_cdr.asp? url file-\=/docrep/006/ad710e/ad710e0i.htm
- [5] Houghton R. Tsunami emergency: lessons from previous natural disasters. Action learning network for accountability and performance, Overseas Development Institute, London, 2005. www.alnap. org/lessons_tsunami.htm
- [6] Wisner B. The communities do science! Proactive and contextual assessment of capability and vulnerability in the face of hazards. In: Bankoff G, Frerks G, Hilhorst T, editors. Vulnerability: disasters, development and people. London: Earthscan; 2002.
- [7] Organization of American States. The Caribbean disaster mitigation project: technical assistance for natural disaster management at the regional scale. Washington, DC. 1997. www.oas.org/CDMP/document/papers/cdmptech.htm
- [8] McDonald F. Environmental influences on disaster impacts: an emerging concern for the Caribbean. environmental issues in disaster prevention, preparedness and response. United Kingdom, In: Conference Proceedings, 18 March 1999, GREEN Cross, UK, www.ww2bw.org/eforums/mcdonaldthoughts
- [9] Beatley T, Berke P. After the hurricane: linking recovery to sustainable development in the Caribbean. Baltimore (MD): Johns Hopkins University Press; 1998.

- [10] International Food Policy Research Institute. When disaster strikes. IFPRI Forum, March, 2005. www.ifpri.org/pubs/newsletters/ifpri-forum/IF200503.htm
- [11] FAO (Food and Agriculture Organization). Report of the FAO Asia-Pacific conference on early warning, prevention, preparedness and management of disasters in food and agriculture. RAP Publication 2001/14FAO: Regional office for Asia and the Pacific, Bangkok, Thailand 2001
- [12] Grunewald F, de Geoffroy V, Lister S. NGO responses to hurricane mitch: evaluations for accountability and learning, HPN Paper 34. London: Overseas Development Institute; 2000.
- [13] Inter-American Development Bank. Facing the challenge of natural disasters in Latin America and the Caribbean: an IDB action plan. Environment Division, Washington DC, 2000.
- [14] IMM Ltd. Learning lessons from the cyclone: a study of DFID's support for post-cyclone livelihoods rehabilitation in Orissa, India. University of Exeter, United Kingdom, 2001.
- [15] Smith LED, Nguyen Khoa S, Lorenzen K. Livelihood functions of inland fisheries: policy implications in developing countries. Water Policy 2005;7(4):359–84.
- [16] Bailey C, Pomeroy C. Resource dependency and development options in coastal southeast Asia. Society and Natural Resources 1996:9:191–9.
- [17] Allison EH, Ellis F. The livelihoods approach and management of small-scale fisheries. Marine Policy 2001;25:377–88.
- [18] Pollnac RB, Pomeroy RS, Harkes IHT. Fishery policy and job satisfaction in three southeast Asian fisheries. Ocean and Coastal Management 2001;44(7–8):531–44.
- [19] Pomeroy RS. Socioeconomic dimensions of aquaculture as a solution to destructive fishing. Technical report FTR4. Community Conservation Network, Honolulu, Hawaii, 2004.
- [20] Pomeroy RS. Small-scale fisheries management and development: towards a community-based approach. Marine Policy 1991;15(1): 39–48
- [21] IMM Ltd.(a) nd. The sustainable livelihoods approach in the coastal context. SCL Working Paper 1. University of Exeter, UK.

- [22] IMM Ltd.(b) nd. Sustainably enhancing and diversifying the livelihoods of the coastal poor. SCL Working Paper 7. University of Exeter, UK.
- [23] Kurien J. The blessing of the commons: small-scale fisheries, community property rights and coastal natural assets. Working Paper 349. Center for Development Studies, Thiruvananthapuram, India, 2003.
- [24] Kurien J. Small-scale fisheries in the context of globalization. Center for Development Studies, Thiruvananthapuram, India, 1998.
- [25] Silvestre G, Garces LR, Stobutzki I, Ahmed M, Valmonte-Santos RA, Luna CZ, Zhou W. South and south-east Asian coastal fisheries: their status and directions for improved management, conference synopsis and recommendations. In: Silvestre G, Garces LR, Stobutzki I, Ahmed M, Valmonte-Santos RA, Luna CZ, Lachica-Alino L, Munro P, Christensen V, Pauly D, editors. Assessment, management and future directions for coastal fisheries in Asian countries. Worldfish Center Conference Proceedings 67, Penang, Malaysia, 2003.
- [26] Department of Environment and Natural Resources (DENR), Bureau of Fisheries and Aquatic Resources (BFAR), Department of Interior and Local Government (DILG). Philippine coastal management guidebook no 3: coastal resource management planning. Cebu City, Philippines:Coastal Resource Management Project of the Department of Environment and Natural Resources;2001.
- [27] Olsen S, Matuszeski W. Coastal science and the tsunami: time for some tough love. Coastal Resources Center, University of Rhode Island. Draft 1/31/05, 2005.
- [28] Ribot J. Democratic decentralization of natural resources: institutionalizing popular participation. Washington, DC: World Resources Institute; 2002.
- [29] Association of Southeast Asian Nations-Southeast Asian Fisheries Development Center. ASEAN-SEAFDEC regional technical consultation on rights-based fisheries and co-management systems for small-scale fisheries. In: Proceedings of a Conference. Jakarta, Indonesia. 18–20 July 2005. Southeast Asian Fisheries Development Center, Bangkok, 2005.